the context clearly indicates otherwise. It will be further understood that the terms "comprises," and/or "comprising" when used in this specification, specify the presence of stated features, integers, steps, operations, members, elements, and/or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, operations, members, elements, and/or groups thereof.

[0061] Hereinafter, various embodiments will be described with reference to schematic views illustrating embodiments. In the drawings, for example, due to manufacturing techniques and/or tolerances, modifications of the shape shown may be estimated. Thus, embodiments should not be construed as being limited to the particular shapes of regions shown herein, for example, to include a change in shape results in manufacturing. The following embodiments may also be constituted by one or a combination thereof.

[0062] The various embodiments described below may have a variety of configurations and propose only a required configuration herein, but are not limited thereto.

[0063] In addition, a surface of each lens closest to an object is referred to as a first surface or an object-side surface, and a surface of each lens closest to an imaging surface is referred to as a second surface or an image-side surface. A person skilled in the relevant art will appreciate that other units of measurement may be used. Further, in the present specification, all radii of curvature, thicknesses, OALs (optical axis distances from the first surface of the first lens to the image sensor (OALs), a distance on the optical axis between the stop and the image sensor (SLs), a through-the-lens (TTL), image heights or ½ of a diagonal length of the imaging plane (IMGHs) (image heights), and black focus lengths (BFLs) (back focus lengths) of the lenses, an overall focal length of an optical system, and a focal length of each lens are indicated in millimeters (mm). Further, thicknesses of lenses, gaps between the lenses, OALs, and SLs are distances measured based on an optical axis of the lenses.

[0064] Further, in a description for shapes of the lenses, surface of a lens being convex means that an optical axis portion of a corresponding surface is convex, and a surface of a lens being concave means that an optical axis portion of a corresponding surface is concave. Therefore, even in the case that one surface of a lens is described as being convex, an edge portion of the lens may be concave. Likewise, even in the case that one surface of a lens is described as being concave, an edge portion of the lens may be convex. In other words, a paraxial region of a lens may be convex, while the remaining portion of the lens outside the paraxial region is either convex, concave, or flat. Further, a paraxial region of a lens may be concave, while the remaining portion of the lens outside the paraxial region is either convex, concave, or flat.

[0065] In the optical system, according to embodiments, the first to fifth lenses are formed of materials including glass, plastic or other similar types of polycarbonate materials. In another embodiment, at least one of the first through fifth lenses is formed of a material different from the materials forming the other first through fifth lenses.

[0066] An optical imaging system includes an optical system including lenses. For example, the optical system of the optical imaging system may include five lenses having refractive power. However, the optical imaging system is not limited to including only the lenses having the refractive power. For example, the optical imaging system may include a stop to control an amount of light. In addition, the optical imaging system may further include an infrared cut-off filter filtering infrared light. Further, the optical imaging system may further include an image sensor, such as an imaging device, configured to convert an image of a subject incident thereto through the optical system into electrical signals. Further, the optical imaging system may further include a gap maintaining member adjusting a gap between lenses.

[0067] First to sixth lenses are formed of materials having a refractive index different from that of air. For example, the first to sixth lenses are formed of plastic or glass. At least one of the first to sixth lenses has an aspherical shape. As one example, only the sixth lens of the first to sixth lenses may have the aspherical shape. In addition, at least one surface of all of the first to sixth lenses is aspherical. In an example, the aspherical surface of each lens may be represented by the following Equation 1:

$$Z = \frac{cr^2}{1+\sqrt{1-(1+k)c^2r^2}} + Ar^4 + Br^6 + Cr^8 + Dr^{10} + Er^{12} + Fr^{14} + Gr^{16} + Hr^{18} + Jr^{20} \quad \text{[Equation 1]}$$

[0068] In this equation, c is an inverse of a radius of curvature of the lens, k is a conic constant, r is a distance from a certain point on an aspherical surface of the lens to an optical axis, A to J are aspherical constants, and Z (or SAG) is a distance between a certain point on the aspherical surface of the lens at the distance Y and a tangential plane meeting the apex of the aspherical surface of the lens.

[0069] In accordance with an embodiment, an optical imaging system includes six lenses, a filter, an image sensor, and a stop. Next, the above-mentioned components will be described.

[0070] The first lens has a refractive power. For example, the first lens has a negative refractive power.

[0071] At least one surface of the first lens is concave. For example, an object-side surface of the first lens is concave. In one example, an image-side surface of the first lens is concave in a paraxial region and gradually outwardly curves (such as inflection points), at edge portions thereof. An object-side surface of the first lens is concave in the paraxial region and gradually flattens at edge or end portions of the first lens.

[0072] The first lens has an aspherical surface. For example, both surfaces of the first lens are aspherical. The first lens is formed of a material having high light transmissivity and excellent workability. For example, the first lens is formed of plastic. However, a material of the first lens is not limited to plastic. For example, the first lens may be formed of glass.

[0073] The second lens has a refractive power. For example, the second lens has a positive refractive power or a negative refractive power.

[0074] At least one surface of the second lens is convex. For example, an image-side surface of the second lens is convex. In this example, an object-side surface of the second lens is concave in a paraxial region. In another embodiment, an image-side surface of the second lens is concave and the object-side surface of the second lens is convex. In one embodiment, end portions of the object-side surface of the second lens overlaps, at least in part, with at least a portion